2.2.1.4 Interim Storage of ILAW in Grout Vaults

Grout vaults constructed in the 1980s would be used for interim storage of ILAW in the cullet form in the No Action Alternative. The existing vaults were designed to store low-activity tank waste in a grout-like form. Modifications to the vaults would be required before ILAW storage could take place. The modifications include excavation of surface materials, disassembly of vault covers, minor repairs to concrete surfaces and testing of leachate collection system, construction of superstructure over each vault to provide protection against wind and rain, and installation of additional leak detection monitoring. Once modifications are completed, ILAW canisters containing glass cullet form would be transported from WTP to the vaults via a tractor-trailer. A gantry crane would emplace the canisters. This process would continue until such time that new vaults could be constructed for disposal of the canisters. Then the canisters would be removed from the grout vaults and placed into the disposal vaults along with newly generated canisters.

2.2.2 Treatment and Processing Facilities

Treatment and Processing Facilities

Existing Facilities
- WRAP
- T Plant Complex
- ETF
- Commercial Treatment Facilities
- In-Trench Grouting
- Other DOE sites

Proposed New/Modified Facilities
- Modified T Plant Complex
- New Waste Processing Facility
- Mobile TRU Processing Facility
- Pulse Driers
- Commercial Treatment Facilities

Treatment and processing facilities include those used to treat MLLW to applicable regulatory standards, as well as those where TRU waste is processed and certified for shipment to WIPP. DOE is currently using a combination of Hanford and offsite facilities to treat some CH MLLW and CH TRU waste. Commercial facilities have provided treatment capabilities for limited quantities of CH MLLW under two existing contracts. DOE does not currently have facilities for treatment of most CH MLLW, treatment of RH MLLW or TRU waste, or for non-standard containers of MLLW and TRU waste. The ETF provides treatment for leachate from the MLLW trenches. Cat 3 wastes are treated either by in-trench grouting or placement in HICs as discussed in Section 2.2.3.

2.2.2.1 Waste Receiving and Processing Facility

The Waste Receiving and Processing Facility (WRAP) began operation in 1998 on the Hanford Site for management of TRU waste, MLLW, and LLW. The major function of WRAP is the inspection, repackaging, and certification of CH TRU waste to prepare it for transport and disposal at WIPP. The facility is also used to verify that incoming LLW meets HSSWAC, and to characterize MLLW for quality assurance purposes. A picture of WRAP is shown in Figure 2.6.

WRAP can accept CH drums and standard waste boxes. Handling of drums and boxes can be performed manually or by use of automated guided vehicles. WRAP provides the capability for non-destructive examination (NDE) and non-destructive assay (NDA) of incoming waste. The NDE is an X-ray process used to identify the physical contents of the waste containers in supporting waste characterization (see Figure 2.7). The NDA is a neutron or gamma energy assay system used to determine radionuclide content and distribution in waste packages.

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Figure 2.6. Waste Receiving and Processing Facility

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Figure 2.7. X-Ray Image of Transuranic Waste Drum Contents

A layout for the 4806 m^2 (51,700 ft^2) facility is shown in Figure 2.8. The layout illustrates the major functions of shipping and receiving, examination, and repackaging within WRAP. Many operations at the facility, such as handling, opening, and processing waste packages, are conducted in gloveboxes or using automated equipment to minimize worker exposure to radioactive and hazardous materials. Certified CH TRU waste drums and standard waste boxes are loaded into TRUPACT-II shipping containers for transport from the facility to WIPP. Figure 2.9 shows the loading of a TRUPACT-II container in the WRAP.

WRAP also has limited treatment capabilities for TRU waste and MLLW by deactivation, solidification or absorption of liquids, neutralization of corrosives, amalgamation of mercury, microencapsulation, macroencapsulation, volume reduction by super compaction, stabilization of reactive waste, and repackaging waste as needed.

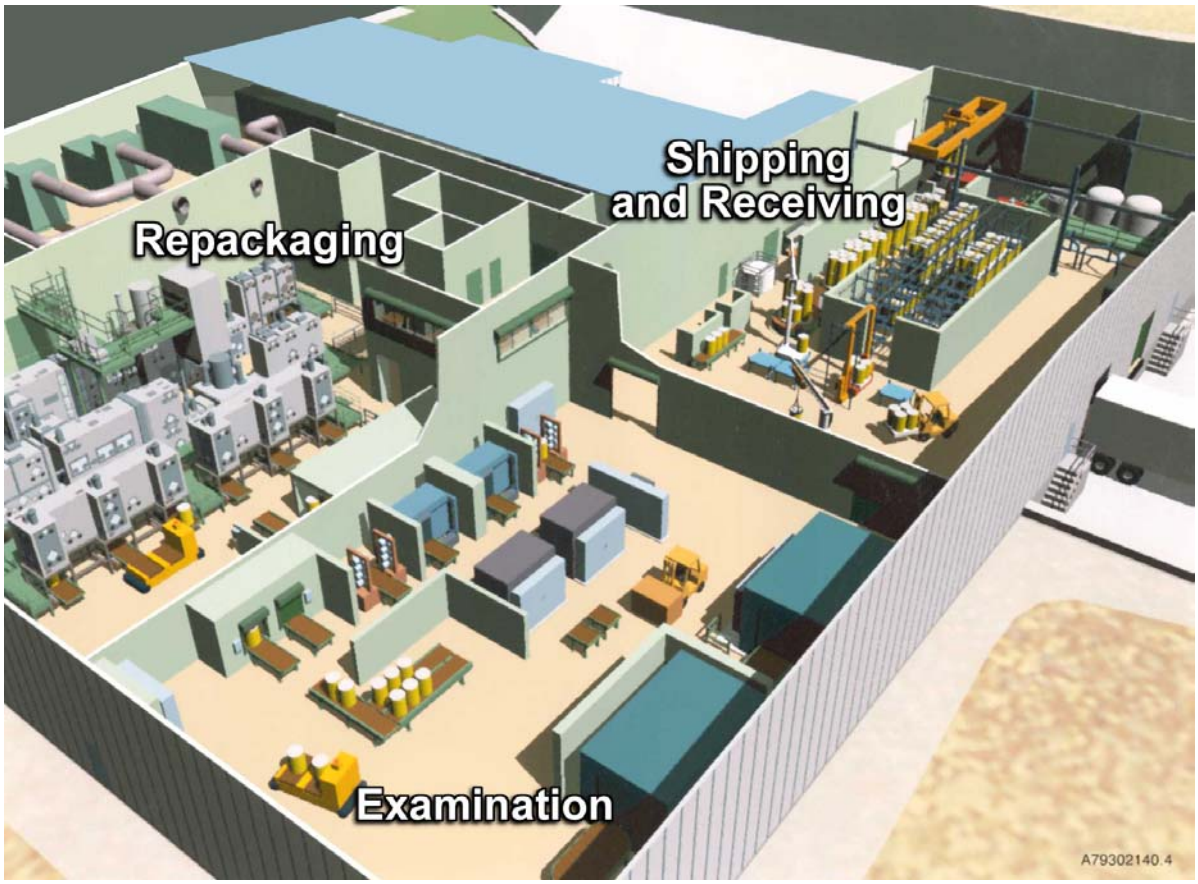

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Figure 2.8. Layout for the Waste Receiving and Processing Facility

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Figure 2.9. Transuranic Package Transporter-II Being Loaded in the Waste Receiving and Processing Facility

Proposed New/Modified Treatment Facility: Mobile TRU Processing Facility

Mobile TRU Processing Facilities or Accelerated Process Lines (APL) have been proposed for Hanford to accelerate the rate at which TRU waste can be certified and shipped to WIPP. The functions of the APLs are similar to functions in WRAP with capabilities to do NDA, NDE, headspace gas sampling, repackaging, and visual examination of the waste packages. The facilities will also have a loadout facility for TRUPACT-IIs. The facilities are expected to be developed in stages or modules so that the first module will process the standard 55-gal drums and a second module will process larger boxes. Two stage-one APLs are anticipated, each with a capacity to process about 2000 CH drums per year. It is anticipated that the headspace gas-sampling units will be inside one of the CWC buildings. Other units will be located outside but near the CWC buildings, on ground that has already been disturbed.

2.2.2.2 Commercial Treatment

Commercial treatment services have been used to treat some Hanford MLLW streams. These treatment capabilities consist of both non-thermal and thermal processes. Two contracts were placed with Allied Technology Group, Inc. (ATG) for thermal and non-thermal treatment of Hanford MLLW in a demonstration project beginning in 2000. Other commercial treatment contracts are being established by Hanford and through the broad spectrum contracts at Oak Ridge.

The non-thermal treatment contract provided for treatment of at least 1600 m^3 (56,500 ft^3) of MLLW and has been successfully completed and a new commercial contract has now been established for continued treatment of MLLW. The MLLW will largely consist of debris waste and will be treated principally by stabilization and macroencapsulation. Waste being macroencapsulated is shown in Figure 2.10. The local commercial treatment facility has some capability for physical extraction, neutralization, chemical oxidation, chemical reduction, microencapsulation, and deactivation. The local facility also has pretreatment capability for size reduction, drying, and sorting. The stabilization processes can be either cement or polymer based. Additional details on local commercial processes can be found in DOE 1998.

The thermal treatment contract was to begin in 2001 and provide processing of a minimum of 600 m^3 (21,200 ft^3) and a maximum of 3585 m^3 (126,600 ft^3) MLLW over a 5-year period. ATG planned to use a high-temperature plasma arc process to convert most organic contaminants to carbon dioxide and water (DOE 1999), however the unit experienced significant problems and has not been able to process the contracted volumes of waste and is no longer operating. At this point, the future of the thermal treatment unit remains uncertain. ATG has entered bankruptcy and the trustee in bankruptcy is seeking to sell the ATG Richland Operation.

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Figure 2.10. Macroencapsulation of Mixed Low-Level Waste Debris at a Local Commercial Treatment Facility

Proposed New/Modified Treatment Facility: Commercial Treatment Facilities

Additional contracts with commercial treatment facilities would provide treatment for CH MLLW and non-conforming LLW. Thermal treatment capabilities are still needed and may be available in the future either locally or at other commercial facilities.

2.2.2.3 Leachate Treatment

Lined disposal facilities are required to incorporate a leachate collection system (WAC 173-303). The collection system retains rain and snowmelt that may contact waste and leach hazardous constituents from the waste. The leachate from onsite mixed waste trenches and future lined disposal facilities is collected and either sent to the 200 East Area Liquid Effluent Retention Facility (LERF) prior to treatment in the ETF or sent directly to ETF. Leachate is currently transported from lined disposal trenches by tanker truck. The ETF treats liquid waste using pH adjustment, filtration, ultraviolet light and peroxide destruction of organic materials, reverse osmosis, and ion exchange. The leachate to be treated at ETF is required to meet ETF waste acceptance criteria. The volume of leachate is expected to depend on the exposed surface area of the trenches.

Proposed New/Modified Treatment Facility: ETF Replacement Capability

The ETF is scheduled to shut down at the end of 2025. After 2025 pulse driers would be used for leachate treatment. The pulse driers treat leachate by evaporation, leaving behind solids as secondary waste. These secondary wastes would be treated, as necessary, and disposed of in MLLW trenches as part of MLLW Action Alternatives. Depending on the amount of trench space available, these secondary wastes may be stored in CWC as part of the No Action Alternative.

2.2.2.4 T Plant Complex

The T Plant Complex consists of a number of buildings, as shown in Figure 2.11. The T Plant canyon and tunnel (221-T Building) are used for handling and processing of materials that require remote handling. Spent commercial reactor fuel and other RH wastes have been stored in the T Plant canyon. Dry decontamination, inspection, segregation, verification, and repacking of RH and large items are performed in the canyon. Current plans are to use the water-filled basin and refurbished process cells at T Plant to provide storage for the K Basin sludge (DOE 2001b). The sludge is expected to remain in the T Plant canyon until a treatment facility is available.

The T Plant canyon was built of reinforced concrete during 1943 and 1944 as a chemical reprocessing plant for defense program materials and was subsequently converted to decontamination and support functions in 1957. The building is 21 m (68 ft) wide, 259 m (850 ft) long, and 23 m (74 ft) high. The 37 cells within the building are designed to accommodate very high levels of radioactivity, and most cells have concrete shielding that is 2.1 m (7 ft) thick.

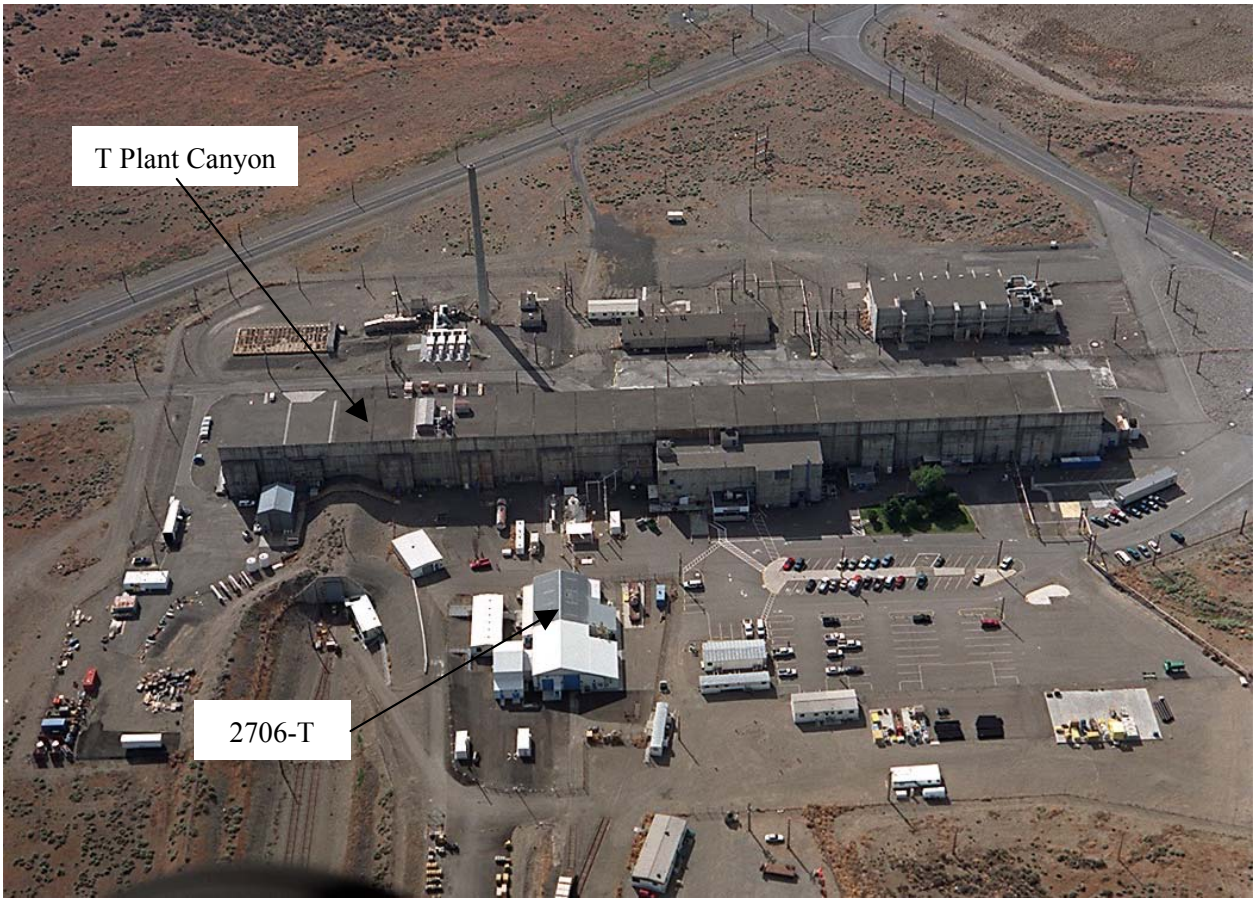

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Figure 2.11. View of the T Plant Complex with 2706-T Facility and the T Plant Canyon Noted

Inspection, verification, opening, sampling, sorting, and limited treatment and repackaging of LLW, MLLW, and TRU waste are performed in the 2706-T Facility and other areas in the T Plant Complex. The 2706-T Facility, initially constructed during 1959 and 1960, was remodeled in 1998 to expand decontamination and treatment capabilities.

Proposed New/Modified Treatment Facility: Modified T Plant

In some MLLW alternatives and TRU waste alternatives, the T Plant Complex would be modified to establish the capabilities to treat/process waste for which no treatment capability currently exists. These waste streams include RH MLLW, MLLW in non-standard packages, RH TRU waste, CH TRU waste in non-standard containers, and PCB-commingled TRU waste. Specific capabilities provided by this modified T Plant would include stabilization, macroencapsulation, deactivation, sorting, sampling, repackaging NDE, and NDA.

MLLW would be treated to meet applicable regulatory requirements so that it can be disposed of in the MLLW trenches. TRU waste would be processed and shipped to WIPP.

Proposed New/Modified Treatment Facility: New Waste Processing Facility

As an alternative to modifying T Plant and using commercial contracts for MLLW and TRU waste treatment, a new facility would be constructed to process/treat the same waste streams and have all of the capabilities identified above for the modified T Plant Complex and for commercial treatment.

CH MLLW in standard containers, non-conforming LLW, elemental lead, and elemental mercury would also be treated in this new facility. Specific capabilities provided by the new facility to treat these waste streams could include stabilization, macroencapsulation, thermal desorption, mercury amalgamation, deactivation, sorting, sampling, repackaging, NDE, and NDA.

The new facility location is assumed to be in the 200 West Area near WRAP, consistent with previous DOE proposals for a modular complex to process MLLW and TRU waste. The new facility would be expected to be larger than WRAP (FH 2003).

MLLW would be treated to meet applicable regulatory requirements so that it can be disposed of in the MLLW trenches. TRU waste would be processed and shipped to WIPP.

2.2.3 Disposal Facilities

Disposal Facilities

Existing Facilities

- LLBGs
  - LLW Trenches
  - MLLW Trenches
- ERDF

Proposed New/Modified Facilities

- Existing Design Unlined LLW Trenches
- Deeper, Wider Unlined LLW Trenches
- Single Expandable Unlined LLW Trench
- Deeper, Wider Lined LLW Trenches
- Existing Design MLLW Trenches
- Deeper, Wider Lined MLLW Trenches
- Single Expandable Lined Trench
- Melter Trench
- ILAW Multiple Trenches
- ILAW Disposal Vaults
- ILAW Expandable Trench
- Modular Lined Combined Use Disposal Trenches
- Closure Caps

Facilities used for LLW and MLLW disposal at Hanford consist of the LLBGs and the Environmental Restoration Disposal Facility (ERDF). New or modified facilities would be developed for LLW, MLLW, ILAW, and WTP melters. Each of the existing and proposed new facilities considered in the alternatives is described in this section.

TRU wastes are disposed of in New Mexico at WIPP, which is the DOE repository for TRU wastes. Hanford began shipping TRU waste to WIPP in the summer of 2000 and would continue shipping TRU waste to WIPP for disposal.

LLW has been buried on the Hanford Site since the start of the defense materials production mission. Six LLBGs are located in the 200 West Area (218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, 218-W-5, and 218-W-6) and two LLBGs are in the 200 East Area (218-E-10 and 218-E-12B). These eight disposal facilities are collectively referred to as the LLBGs. See Appendix D for additional information about each LLBG. The LLBGs have historically been used for temporary storage of some waste (these functions were previously described). Figure 2.12 shows a picture of a burial ground with both open and covered trenches.